

# **LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES**



**OFFICE OF FISHERIES  
INLAND FISHERIES SECTION**

**PART VI -B**

**WATERBODY MANAGEMENT PLAN SERIES**

**LAKE ST. JOSEPH**

**WATERBODY EVALUATION &  
RECOMMENDATIONS**

# **CHRONOLOGY**

DOCUMENT SCHEDULED TO BE UPDATED EVERY THREE YEARS

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Ryan Daniel, Biologist Manager, District II

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## TABLE OF CONTENTS

<b>WATERBODY EVALUATION.....</b>	<b>4</b>
<b>STRATEGY STATEMENT .....</b>	<b>4</b>
<i>Recreational.....</i>	<i>4</i>
<i>Species of Special Concern.....</i>	<i>4</i>
<b>EXISTING HARVEST REGULATIONS .....</b>	<b>4</b>
<i>Recreational.....</i>	<i>4</i>
<b>SPECIES EVALUATION.....</b>	<b>4</b>
<i>Recreational.....</i>	<i>4</i>
<i>Recreational Creel Survey.....</i>	<i>8</i>
<b>HABITAT EVALUATION .....</b>	<b>9</b>
<i>Aquatic Vegetation .....</i>	<i>9</i>
<i>Substrate.....</i>	<i>10</i>
<i>Available complex cover.....</i>	<i>10</i>
<b>CONDITION IMBALANCE / PROBLEM .....</b>	<b>10</b>
<b>CORRECTIVE ACTION NEEDED .....</b>	<b>11</b>
<b>RECOMMENDATIONS .....</b>	<b>13</b>
<b>REFERENCE LITERATURE .....</b>	<b>14</b>

# WATERBODY EVALUATION

## STRATEGY STATEMENT

### Recreational

Sportfish species are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts.

### Commercial

Commercial species are managed only with State regulations. A commercial fishery exists. Harvest is encouraged.

### Species of Special Concern

There are no species of special concern in Lake St. Joseph.

## EXISTING HARVEST REGULATIONS

### Recreational

Statewide regulations are in effect for all fish species. Recreational fishing regulations may be viewed at the link: <http://www.wlf.louisiana.gov/fishing/regulations>

### Commercial

Statewide commercial regulations are in effect. There is no closed season. Commercial fishing regulations may be viewed at the link below:  
<http://www.wlf.louisiana.gov/fishing/regulations>

## SPECIES EVALUATION

### Recreational

Limited sampling of the recreational fisheries has been conducted on Lake St. Joseph. Largemouth bass are typically targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain. Electrofishing is an efficient indicator of largemouth bass abundance and size distribution, with the exception of large fish. Shoreline seining is also used to collect information related to fish reproduction and forage availability. Evaluations of common recreational species are listed below and based upon electrofishing samples in 2008 and 2012 and a single seine sample in 2008.

### *Largemouth Bass*

#### Relative abundance and length distribution-

Electrofishing samples were taken in both spring and fall of 2012, but only during spring of 2008. Only six bass were captured in 45 minutes of sampling in 2008. In 2012, a total of nine largemouth bass were collected in 45 minutes of sampling during spring and only 3 bass were collected in 56 minutes during fall, which included an additional 15 minute forage sample. The catch-per-unit-effort (CPUE) results from electrofishing are typically reported as the number of fish per hour, thus catch rates for spring and fall were 12 and 3.2 bass per

hour, respectively. These values are considered extremely low, while values closer to 100 bass per hour would be indicative of a productive fishery. Figure 1 below shows the length frequency distribution of LMB for the 2012 spring sample. Though total catch was not high, several size classes are represented, including fingerling size young-of-the-year (YOY) fish, which were likely a result of the 2012 spawning season.

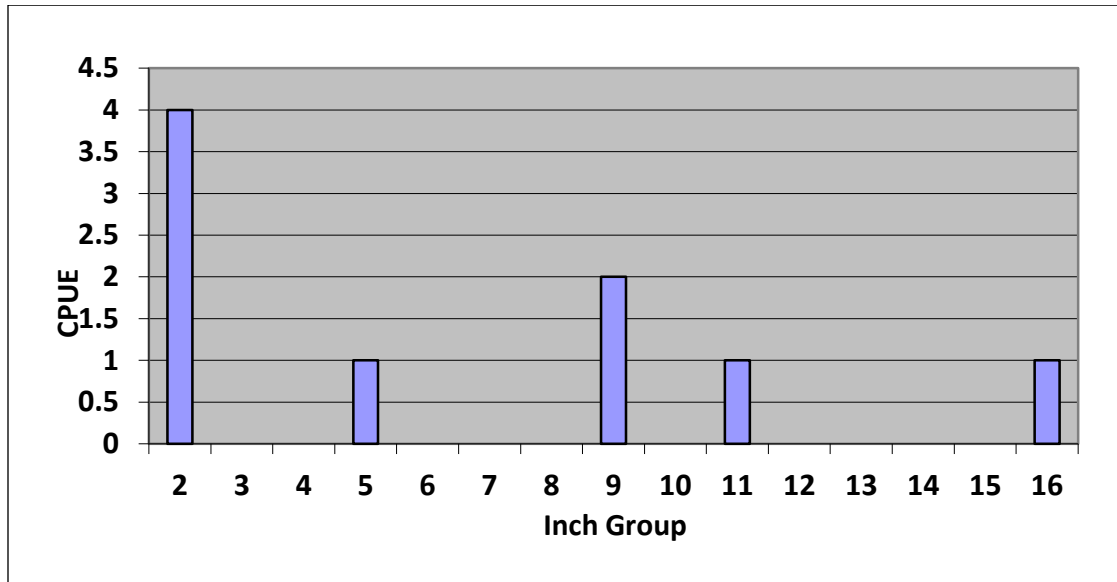


Figure 1. The length frequency distribution of largemouth bass captured from Lake St. Joseph, LA during a spring electrofishing sample in 2012.

Largemouth bass are also collected during seine sampling, which is used to estimate forage availability and sportfish reproduction. Samples are normally taken at boat ramps after dark during the summer months. A total of 34 bass fingerlings (size 1in. – 3in.) were captured in a single seine sample in June of 2008. These YOY fish were most likely the result of a successful bass spawn a few months prior.

#### Relative weight-

Relative weight (Wr) is defined as the ratio of a fish's weight to the weight of a "standard" fish of the same length. The Wr index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth bass relative weights below 80 may indicate a problem of insufficient or unavailable forage, whereas relative weights closer to 100 indicate sufficient available forage. This measurement is obtained from fall samples only. Samples taken in 2012, though only from three adult bass, showed relative weights to be in excess of 86%.

Largemouth bass genetics- A single stocking of nearly 20,000 Florida largemouth bass (*Micropterus floridanus*) was made in 1999. The purpose of this stocking was to incorporate Florida genetics into the native population, which was believed to consist entirely of northern largemouth bass (*M. salmoides*). The addition of the Florida bass was an effort to produce bass that would be larger than what is typically expected from a population of northern bass. No subsequent evaluations of this stocking have been made. Genetic analyses from liver samples can determine whether individual fish are Florida bass, northern bass, or are an Fx

cross (hybrid) of both species. An evaluation would require a significant sample size, which has been difficult to obtain in Lake St. Joseph.

#### Largemouth bass age and growth-

Age and growth estimates have not been determined for Lake St. Joseph largemouth bass. Age is determined by counting the number of annuli (rings) on the sagittal otoliths (ear bones). Growth is evaluated by comparing the length of the fish at capture to its age. As with a genetic evaluation, a significant sample size would be required to obtain accurate age and growth estimates for the population.

#### *Crappie*

Crappies (*Pomoxis spp.*) have never been specifically targeted for capture during LDWF sampling efforts in Lake St. Joseph. Both white crappie (*P. annularis*) and black crappie (*P. nigromaculatus*) have been recorded from previous samples. Both species were collected during spring electrofishing samples in 2008 and 2012. As expected in the shallow, turbid lake, white crappies have been found to be more abundant. Crappies were recorded most recently in the spring electrofishing sample of 2012. However, none were collected during the fall sample. The disparity is not unusual since crappie do not normally inhabit shallow shorelines during the fall. A total of 40 white crappies were collected in 2008 during a 0.75 hour sample. Catch rate for the sample was 56 per hour. Only one black crappie was collected. In the spring 2012 sample, a total of 10 crappie were collected, with seven being white crappie. Total sampling duration was for 0.75 hrs., resulting in an hourly catch rate of 9.33 for white crappie and 4.00 for black crappie. The chart below (Figure 2) shows the length frequency distribution for white crappie from the two spring samples. It appears that multiple age classes are represented in both samples.

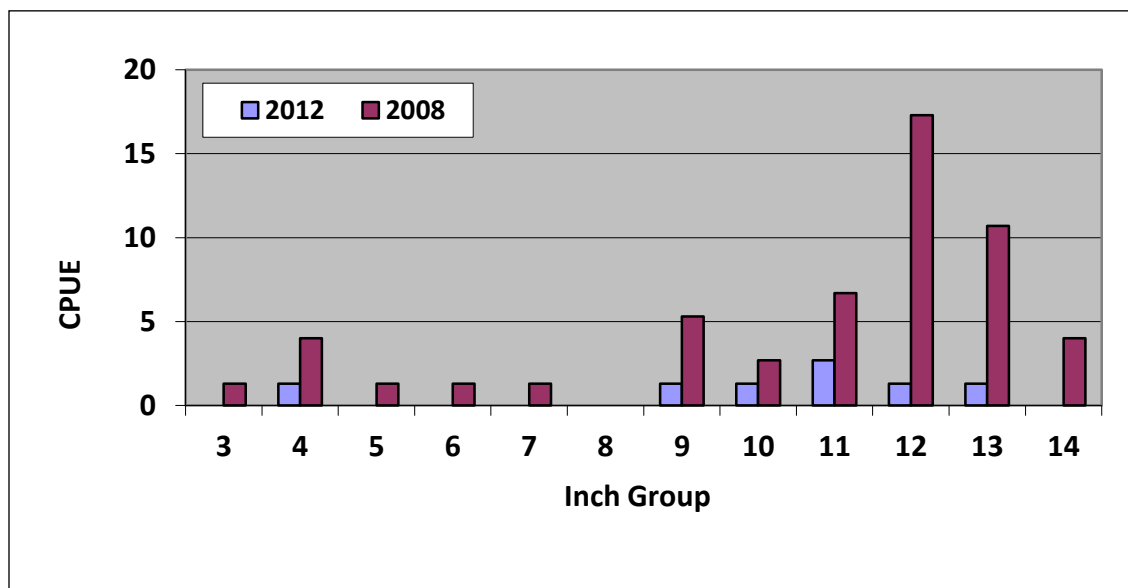


Figure 2. Length frequency distribution of white crappie from spring electrofishing samples conducted on Lake St. Joseph in 2008 and 2012.

Crappies were also recorded in the 1979 and 1987 biomass samples. The 1979 sample (mean of 2 samples) estimated 13.3 lbs. per acre of white crappie, whereas the 1987 sample estimated only 2 lbs. per acre. The 1979 sample consisted primarily of fingerling size fish, with a calculated estimate of 342 fingerlings per acre. Black crappies were not collected in 1979 and were negligible in 1987. These biomass estimates are considered very low for crappie in this type of waterbody. Despite low numbers from these and more recent samples, recreational angling for crappie is popular on Lake St. Joseph, especially with yo-yo's during spring.

### *Sunfish*

Sunfish *Lepomis spp.* comprise an important component of the sport fisheries in Lake St. Joseph. Bluegill (*L. macrochirus*) are the most abundant “sunfish” species, while other species documented from forage, seine, and biomass samples include longear sunfish (*L. megalotis*), warmouth (*L. gulosus*), and orangespotted sunfish (*L. humilis*). Sunfish are utilized as forage for predatory species such as largemouth bass, catfish (*Ictalurus spp.*), and gar (*Lepisosteus sp.*). Pounds per acre of sunfish species has been determined from past biomass samples in 1979 and 1987 (Figure 3). The electrofishing forage sample taken in Fall 2012 provided hourly catch rate estimates of 48 for bluegill and 8 for longear sunfish. Length distribution of the bluegill collected in this sample is shown below in Figure 4. A total of 189 bluegill, 16 orangespotted sunfish, and one longear sunfish were captured in the 2008 seine sample. The bluegill ranged in length from 2 – 6 inches, with 93% being in the 2 and 3 inch groups.

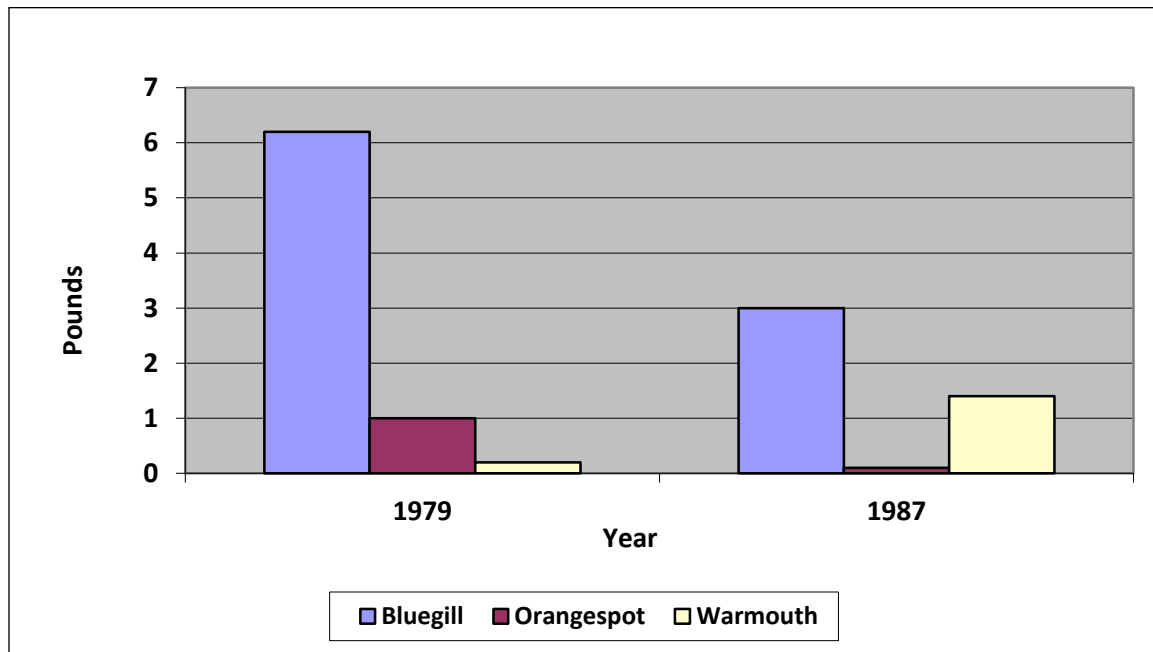


Figure 3. Pounds per acre estimates of sunfish from biomass samples taken from Lake St. Joseph, LA in 1979 and 1987.

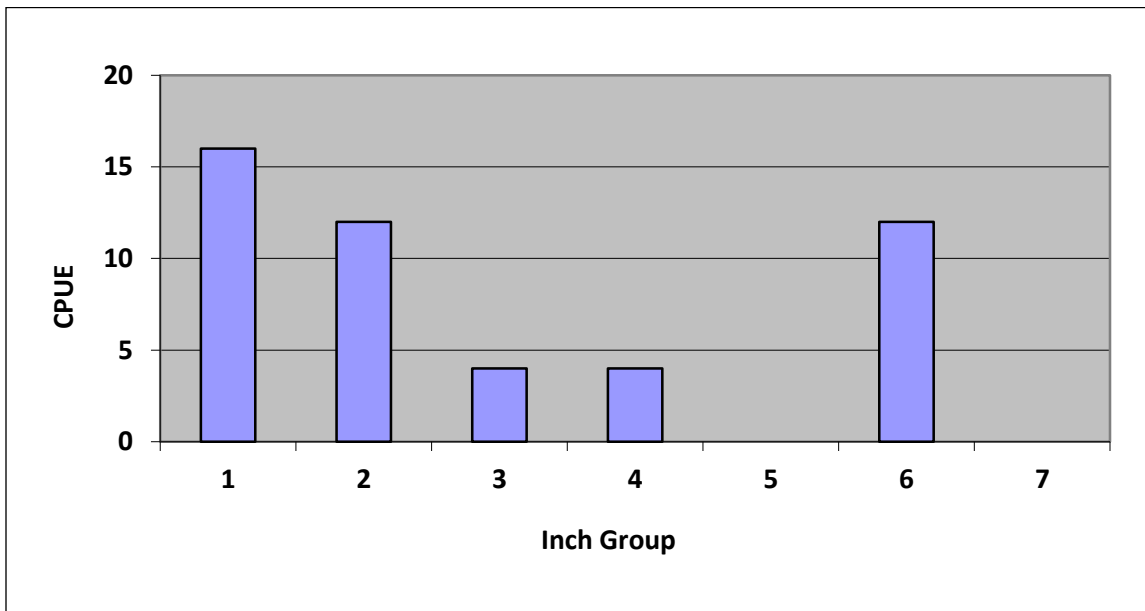


Figure 4. The CPUE (number per hour) of bluegill from Lake St. Joseph, LA for the fall electrofishing forage results conducted in 2012.

#### *Other Forage*

Silversides (*Labidesthes spp.*), gizzard shad (*Dorosoma cepedianum*), threadfin shad (*D. petenense*), western mosquitofish (*Gambusia affinis*) and cyprinid minnows (*Cyprinidae*) have been identified as other significant forage species in Lake St. Joseph. The 2012 electrofishing forage results produced catch rate estimates of 488, 128, and 60 fish per hour for shad, silversides, and mosquitofish, respectively. Cyprinid minnows collected in the 2008 seine sample include the following species: golden shiner (*Notemigonus crysoleucas*), pugnose minnow (*Opsopoeodus emiliae*), and bullhead minnow (*Pimephales vigilax*).

#### Recreational Creel Survey

No creel surveys have been conducted on Lake St. Joseph.

#### Commercial

Biomass sampling with the use of rotenone in 1979 and 1987 has shown that common commercial fish species have been present in Lake St. Joseph. Species observed in both samples included freshwater drum (*Aplodinotus grunniens*), bigmouth buffalo (*Ictiobus cyprinellus*), spotted gar (*Lepisosteus oculatus*), and channel catfish (*Ictalurus punctatus*). Catch was determined in pounds per acre for these species, and results showed they were not in amounts considered high enough to support a commercial fishery. Although, the 1979 sample estimated 80 lbs. per acre of drum and the 1987 sample showed there to be 26 lbs per acre of bigmouth buffalo in the lake.

## HABITAT EVALUATION

### Aquatic Vegetation

In recent years, the aquatic vegetation community in Lake St. Joseph has been considered to be more problematic than beneficial. Water hyacinth (*Eichhornia crassipes*) and American lotus (*Nelumbo lutea*) have been the most abundant and troublesome species in the lake. Water hyacinth has had a history of forming large surface mats in coves and on either end of the lake. The mats impede navigation and recreation, interfere with native plant growth, can create hypoxic conditions, and often clog the drainage channel in Clark Bayou where the spillway is located. American lotus does have beneficial qualities such as providing shade, cover, and feeding areas for fish, as well as dampening wave action to slow shoreline erosion. In the past 10 years the total coverage of lotus in the lake has exceeded a desirable amount, with nearly the entire southern half of the lake becoming covered in a mat of the floating pads. Coontail (*Ceratophyllum demersum*), a native submerged species of aquatic vegetation, is present throughout the lake, but total coverage is less than desirable for optimal fisheries habitat. The growth of coontail is most likely limited by the high turbidity of the water, as it requires sunlight penetration to near the lake bottom for growth. The shoreline is lined with cypress trees (*Taxodium distichum*) and button bush (*Cephalanthus occidentalis*). These species provide cover for fish and wildlife, but also provide protection for nuisance floating species, allowing coverage to expand to problematic levels while being protected from wind action, frost, and LDWF spray crews.

The LDWF provided a helicopter for spraying in 2009, while the Lake St. Joseph Recreation and Water Control District has provided a crop dusting plane for herbicide application for water hyacinth control in 2007, and lotus control in 2011, 2012, and 2013. The Lake St. Joseph Recreation and Water Control District also provided herbicide in 2011. LDWF provided herbicide for all of the other applications.

Table 1. Acres of American lotus and water hyacinth treated with herbicide on Lake St. Joseph, 2005 – 2013.

<u>Year</u>	<u>Species</u>		
	<u>American Lotus</u> (boat)	<u>American Lotus</u> (aircraft)	<u>Water Hyacinth</u>
2005	18	0	188
2006	31	0	192
2007	177	0	161 (250 by aircraft)
2008	159	0	153
2009	0	380	152
2010	173	0	37
2011	162	200*	12
2012	81	500	90
2013	35	300	142

\*treatment conducted by Lake St. Joseph Recreation and Water Control District

Vegetative cover is predicted to be less in 2014 than has been observed in recent years. Successive treatments of lotus should have reduced the large field on the south end of the lake to less than 250 acres. Freezing conditions during the winter of 2013-2014 should have further reduced the coverage of water hyacinth in portions of the lake. Remaining plants appeared to be dead during a January, 2014 inspection.

### Substrate

The current substrate of Lake St. Joseph is comprised mostly of alluvial soils that have been deposited into the lake by historic flood events and erosion of adjacent croplands. Organic content is high from the accretion of plant materials. This type of substrate is not optimal for nesting sportfish species.

### Available complex cover

Complex cover is lacking in this open, shallow lake. The lake bottom is uniformly flat and depths are usually less than 4 ft. The most prominent forms of complex cover in Lake St. Joseph are found near the shoreline, where bald cypress and button bush are abundant. Vast fields of American lotus provide significant coverage, especially on the south end of the lake.

## **CONDITION IMBALANCE / PROBLEM**

As discussed in the Lake St. Joseph Management Plan Part VI-A, the majority of the lake's problems are a result of it being in the late stages of natural oxbow succession. The historic river channel is almost completely filled with sediment from over 3,000 years of flooding and runoff from adjacent lands. Agricultural development surrounding the lake began over 150 years ago and has been a significant contributor to this process, as sediments from surrounding fields are continuously washed into the lake. Over 90% of the watershed is annually in row crop production. Because of this, fisheries habitat has decreased in quality, specifically the spawning substrate, lack of complex cover, and water quality. With very little deep water refuge, fish kills have become normal during hot summer months, especially when evaporation and crop irrigation contribute to very low water levels. Water temperatures during summer will often exceed 90°F, which stresses fish and limits the water's capacity to contain dissolved oxygen. Because of the high fertility of the surrounding soils, and runoff containing nitrogen and phosphates, excessive algal blooms are also common. This further contributes to the hypoxic condition, as the blooms die off and available oxygen becomes more limited due to the decomposition of the algae. Runoff from agricultural fields also leads to increased turbidity in the water, which limits oxygen production and impairs activities of certain fish species. Recreational activity has also become limited due to the shallow nature of the lake.

Activities associated with the current Section 319 project have identified specific areas and agricultural practices which may be leading to reduced water quality and increased sedimentation. Water quality parameters considered impaired or unacceptable include phosphates, total suspended solids, and dissolved oxygen levels. Sources of these problems include excessive runoff from row crop fields, poorly designed field drainage ditches (Figure 5), inadequate field buffers, and inefficient fertilizer applications.



Figure 5. Example of a poorly designed field drainage ditch near Lake St. Joseph.

## **CORRECTIVE ACTION NEEDED**

Several potential corrective actions were addressed in the proposed aquatic restoration plan submitted to the U.S. Army Corps of Engineers (USACE) in 2003. Excessive cost and potential impacts to other waterbodies were cited as reasons to no longer pursue those proposals. Currently, the Lake St. Joseph Recreation and Water Conservation District is investigating the potential impacts of raising the normal pool stage in the lake one foot to an MSL of 67.0 ft. This would provide additional refuge for fish during drought conditions and when crop irrigation is high. An additional foot of water in the lake during the spawning season may also give fish access to higher quality spawning habitat.

Sedimentation and water quality issues are currently being addressed by the several entities involved with the Section 319 project in an effort to have Lake St. Joseph removed from the 303 (d) list of impaired and threatened waterbodies. Implementing best management practices (BMP's) that reduce sediment and nutrient runoff will be critical to the success of this project and improving the water quality of the lake. The agricultural areas surrounding the lake, especially the fields directly adjacent, have been identified as high priority areas for BMP implementation. Most agricultural producers adjacent to the lake currently utilize conservation tillage techniques in addition to Conservation Reserve Program (CRP) and Wetland Reserve Program (WRP) BMP's. Increased corn production in the area and throughout the state has led to the need of production systems to improve nutrient use efficiency and BMP's. The BMP's recommended for Lake St. John should not hinder production or greatly interfere with normal agricultural operations. Table 2 lists the primary BMP's [and the respective Natural Resource Conservation Service (NRCS) practice codes] that have or will be recommended for implementation around Lake St. Joseph.

Table 2. BMPs and respective NRCS Practice Codes under consideration for implementation to fulfill goals of the Section 319 project at Lake St. Joseph, LA.

<b>BMP Description</b>	<b>NRCS Practice Code</b>
Conservation Crop Rotation	328
Cover Crop	340
Residue Management, mulch till	345
Residue Management, seasonal	344
Residue Management, ridge till	346
Residue Management, no till	329
Field Borders	386
Grade Stabilization Structures	410
Grassed Waterways	412
Critical Area Plantings	342
Nutrient Management	590

## RECOMMENDATIONS

1. Assist the Lake St. Joseph Recreation and Water Conservation District and other entities in developing and implementing viable solutions to address the identified habitat problems of Lake St. Joseph. Specific areas of focus should include reduction of additional sedimentation from surrounding watershed.
2. Continue long term monitoring of fisheries to correlate fishery responses with water quality improvement projects.
3. Continue cooperative herbicide treatments to control American lotus on the south end of Lake St. Joseph. As per the agreement, The Lake St. Joseph Recreation and Water Conservation District will provide aerial application equipment and LDWF will provide herbicide for the application. The application should be made following lotus emergence, but prior to the peak flowering period. This period normally occurs during May or June. Glyphosate will be used at a rate of 0.5 gal/acre, mixed with Surf-Ac 910 surfactant (0.25 gal/acre). Surveys will be made on a bi-weekly basis beginning on May 1 to determine the appropriate time for the initial treatment. A 25 yard buffer of lotus should remain around the shoreline of the target area to provide cover for fish and to protect the shoreline from wave erosion.
4. A follow-up herbicide application will be conducted by LDWF to newly emerging pads four weeks after the aerial treatment. Other locations of lotus in the lake will be treated with a goal to minimize expansion but not completely eradicate the plant. Lotus is considered beneficial to fisheries when coverage is moderate.

For control of water hyacinth, LDWF spray crews will apply 2,4-D (0.5 gals/acre) and Red River 90 surfactant (1 pt/acre) when outside of the waiver period of March 15 – Sept. 15. Glyphosate (0.75 gals/acre) and Red River 90 (0.25 gals/acre) will be used during the waiver period.

## **REFERENCE LITERATURE**

Environmental Best Management Practices for Agronomic Crops. 2011. LSU AgCenter Pub. 2807

Louisiana Nonpoint Source Annual Report FFY 2012. Louisiana Dept. of Environmental Quality. p. 25

Water Quality Monitoring of Lake St. Joseph – Final Report. March 27, 2013. LSU AgCenter.

Lake St. Joseph, Louisiana Section 1135 Preliminary Restoration Plan. 2003. U. S. Army Corps of Engineers, Vicksburg, MS